Petroleum; Tales of Dead & Living

The Indus River and its tributaries-the cradle of civilization houses the relics of one of the oldest civilisation along with the remains of the dead buried beneath us, dating back to millions of years. The tale of the living and dead; one composed of water and the other of Hydrocarbons; the components that comprise of water are living, recorded, empirical, visible, and are part of recorded history whereas those of the dead are composed of hydrocarbons dating back to millions of years.

The progress of civilisation is almost entirely dependent upon hydrocarbons as they provide us with much needed fuel for our survival. Pakistan is a unique country in a sense that here civilisation, the living and dead are present. Mohenjo Dharo and Harappa are among the oldest civilisations in the world that took birth along River Indus and its tributaries almost 5000 years ago and their ruins are still present. In Pakistan some of the world's largest reservoir of hydrocarbons has been discovered in the last century and ~~the~~ exploration is still underway. There is a definite connection between both and this makes study of living history and exploration of dead underneath us an interesting phenomenon.

Ancient civilisations knew about the subsurface minerals, including petroleum;[1] a name derived from Latin 'Petra ' and Greek 'leum' thus a liquid or oil from a rock ': however the word came into use in the 15th Century ~~A.D~~ through a German mineralogist George Bauer.[2] The later day archaeological discoveries reveal~~s~~ that civilisations on the banks of the great rivers Euphrates, Tigris, Nile, and Indus were using this rock oil as early as 7000 B.C for: construction of bridges ~~as~~ by Sumerians, mummification by Egyptians and for water proofing of structures by Aryans in Harappa and Mohenjo Dharo. It is a strange coincidence that some of the world's largest petroleum reservoirs have been discovered on the sites of these very ancient civilisations like oil reservoirs in Iraq, Iran, and natural gas reservoirs in Pakistan.[3]

In the medieval era it was believed that the Earth was created on the 26 October 4004 B.C.[4]. Available scientific evidence highlights, our planet is much older than what a normal human mind can comprehend or calculate, it dates back to almost four

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1 Brittanica Concise Encyclopaedia ,2006,s.v.''petroleum'' https://www.nationalgeographic.org/encyclopedia/petroleum/

2 http://farlang.com/books/agricola-bandy-de-natura-fossilium George Bauer *De Natura Fossillium*, 1546. Also see Pliny's *Natural History*, 76 A.D. Aristotle *Meteorologica*,300B.C.

3 Rhoada Murphy *A History of Asia 7th edition* (Routledge,2014),pp,2-22.

4 https://www.washingtonpost.com/news/speaking-of-science/wp/2017/03/06/dear-science-how-do-we-know-how-old-the-earth-is/.

billion years in terms of geologic time[5] with different ages and era's running-back to almost 200 million years. The origin of our Earth is still debateable; there are various theories; religious, philosophical, biological and geological. The Earth is as old as one can imagine. [6]

Petroleum is a naturally occurring liquid found in rock formations. It consists of a complex mixture of hydrocarbons of various molecular weights, plus other organic compounds. [7] It is generally accepted that oil is formed mostly from the carbon rich remains of ancient plankton after exposure to heat and pressure in the earth's crust over hundreds of millions of years. Over time, the decayed residue was covered by layers of mud and silt, sinking further down into the Earth's crust and preserved there between hot and pressured layers, gradually transforming into oil reservoirs.[8] In 100B.C, a Roman scholar Marcus Terentius highlighted the disinfectant qualities of petroleum vapour thus Romans were the very first to use petroleum for fumigation. By 10th Century A.D, Arabs were distilling oil, both Cairo and city of Jericho were lit with it. Marco Polo in his travelogue highlights that in Baku 'everybody uses oil lamps'.[9] Russian brothers Dubinin had purified kerosene directly from petroleum and the process of refining kerosene from coal was later discovered by Gesner in 1846. Later Ignacyu Kasiewicz improved upon Gesner's method to develop a mean of refining kerosene from the more readily available Rock-Oil or petroleum seepages in 1852. Consequently, the world's very first oil refinery was built in Bodrka near Krosno in 1853. On the American continent, Benjamin Sillimen a Yale professor through experiments was able to fractionate petroleum by distillation. The first modern oil refinery was built in Baku in 1861~~;~~ at that time Azerbaijan was producing almost 90% of world's oil. A commercially pioneer oil well was drilled in Poland in 1853 followed by another in Romania in 1857. Prominent oil refineries were later on built at Jaslo (Poland) and at Ploiestic (Romania) .

Modern petroleum exploration and industry took birth with the Captain Drake's oil drilling on 28 August 1859 at Pennsylvania; it is worth mentioning that Captain Drake had received a letter a day earlier from his investors to terminate the much awaited, funded and almost futile project. This by itself set the pattern of ~~even~~ present-day oil industry. Exploration is the key word in this industry, to explore the earth in search of petroleum; at times ~~it~~ this endeavour is successful and at times it

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5 "Geologic time." *Encyclopedia Britannica. Encyclopedia Britannica Online Academic Edition*. Encyclopedia Britannica Inc., 2012. Web. 20 Feb. 2012. <http://www.britannica.com/EBchecked/topic/229694/geologic-time

6 Dr Lawrence Badash professor of History of Science at University of California, 'The Age of Earth', *Scientific American, August 1964.*

7 /https://www.britannica.com/topic/list-of-petroleum-products-2069393.

8 Stephen Howrath *A Century in oil The Shell transport and Trading Company 1897-1997* Weidenfeld & Nicholson,London,1997,pp-17-22.

9 Ismail Nawab, Peter Speers, Paul Hove *Saudi Aramco and its world. Arabia and the Middle East* (Dahran,ARAMCO,1995),176.

isn't. Before this day of August, the oil was gathered by digging pits or skimming natural seeping from the surface of streams. Captain Drake had drilled to a depth of almost seventy feet. America being the pioneer in petroleum industry set the benchmark~~,~~ and ~~they~~ introduced the word barrel which is the standard unit for measuring oil, it equals to 42 US gallons. In 1865, the world oil production was 7000 barrels, and 6800 barrels were being drilled in USA. By 1895, this production increased to 2, 84,000 barrels daily and by the end of 1945 it was over seven million barrels daily which increased to over sixty million barrels daily in 1990.[10]

In the last century, oil exploration was limited to ~~the~~ areas known to have oil seepage; later a genetic relationship was established between oil traps and structure, known as anticlines. When this method fails then oil is explored subsurface or stratigraphic traps.[11] At present, the world's major oil supply comes from structural traps.

In the Subcontinent, a Geological Survey Department was established in 1851 with the sole aim to discover coal[12] and the first publication came out in 1879-87 known as Manual of Geology in India. [13]The very first oil discovery was rather accidental, the work on Assam Railways in 1887, resulted in the discovery of oil near Digboi; it was simply gushing out of the earth in a malaria infested jungle. It is worth highlighting that the very first oil exploration in India started in 1866, almost thirty miles east of Digboi. The first well at Dibrugarh was 178 feet deep and reached a total depth of 662 feet; later Assam Oil Company was formed in 1899 and was producing 7000 barrels of oil daily at its peak output. In the present-day Pakistan, before it gained independent in 1947, the very first exploration of oil was undertaken by Punjab Government in 1886- 87;[14] In 1866, some seven or eight holes were dug in and around the seepages near Fatehjang, 25 miles west of Islamabad, and in Kundal (Kishor Range) yielding a few gallons of oil per day. Then, in 1870, B. S. Lyitaan, an American from Pennsylvania was hired to investigate the oil prospects of the Punjab. His report is of special interest, since its maps were probably the first ever published on which subsurface structure was delineated by contours. [15]In 1885, in Balochistan, thirteen oil wells were drilled on the oil seepages at Khattan , it was quite a success as almost 20,000 barrels of oil were produced till 1892 when wells became dry. The impetus for this drilling was to establish a convenient source of fuel for the railway system which the then Indian Government was constructing to help secure the Afghanistan - Indian border (Durand Line).

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10 Stephen Howrath *A Century in oil*,pp-17-22.

11 B.R. Hussain *Paleography, a tool for oil exploration in Pakistan*

12 https://www.gsi.gov.in/webcenter/portal/OCBIS?

13 A.H.Kazmi, M.Q.Usman *Geology and Tectonics of Pakistan*. Karachi; Graphic, 1997,pp,10-30.

14 http://www.ppepdr.net/IOP-Brochure.pdf Ministry of Petroleum Pakistan

15 Ministry of Petroleum and Natural Resources, Government of Pakistan , *Investment opportunities in Pakistan's upstream oil and gas sector,* 2009.

Prior to World War I, various investment syndicates (mainly British financed) were formed to explore in the Punjab, the first significant company The Attock Oil Company was established at London on 1st December 1913. Attock Oil Company in collaboration with Burma Oil Company (BOC) in 1915, drilled at Khaur in District Attock; oil was discovered in Miocene and Ecocene reservoirs, it produced oil in excess of four million barrels till 1990. Burma oil Company (BOC) was also engaged in exploration, it carried out surveys including gravity survey of Potohar; they drilled an exploratory well' Chandragupt-1' at Makran Coast ; to a total depth of 810 meters in 1916. Later both AOC and BOC made a combined exploration efforts and consequently Dhullian in 1936, Joya Mir in 1944 and Balkasar in 1946 were the major oil fields discovered in United India and they all became part of Pakistan.

Momal ji Mari

The word *Mari* is a Sindhi word, etymologically meaning; 'birthplace', importantly a place where oil can be found; a trading place of oil. The folklore[16] highlights that almost a millennium ago, there lived a ~~r~~ajah in the present day Daharki area, and he had seven daughters among whom Momal was the most beautiful. The mud palace itself was a remarkable feat of architecture, designed by the daughters themselves, in ~~a.~~ manner that only they knew the correct path to the chambers. When the time for their marriages came, Momal put forward the condition that, only that man could be her husband who could answer all her questions and be able to reach the courtyard. Many ~~a~~ prince came and lost everything in the quest to marry the most beautiful princess of her time.

A day came when, four noble persons from the desert lost their way while hunting and found themselves in a conversation with one such prince who had lost everything in a bid to win over Momal. One of the noble name Rano was finally able to win over Momal, but in the process he had offended his other colleague including the raja to which he was a minister. The power of love was such that Momal and Rano could not live without each other, every night Rano would burn the oil so her lover could keep his direction.

16 Shah Abdul Latif Bhittai died 1761 A.D., a renowned Sindhi man of letters wrote some fabulous love stories, about seven women in the medieval era.

I trimmed the wick again and again
Oil is consumed at last
Stranger-beloved, do return
Riding a camel fast,
Weeping for Rano, night is past
The whole night I wept

Rano was put under the duress of his friendship with the rajah who being jealous ordered Rano not to meet Momal again; love is such a feeling that such restrictions have seldom stopped lovers from fulfilling their soul mating. Rano would travel in disguise on camel, every night travelling long distance and still being able to be at rajah's palace in the morning. This secret did not last long and rajah imprisoned Rano. On the other hand, Momal unaware of Rano's captivity, kept on burning oil every night so Rano could find his lover. One such night, Momal's sister Somal slept with her to console her sister, as fate would have it, Rano was able to make his way to Momal's chamber on that very night and on seeing someone sleeping with Momal, left dejected.

Momal in the morning saw the footprints and the cane of Rano and instantly realized what tragedy fate has played with her. She soon left her palace in disguise and reached her lover's kingdom where she yearned just for his sight. One day she was able to meet him and narrated him the truth which Rano did not believe and as such in order to prove to him her true love, Momal left the palace and jumped into a burning oil well. Rano, as soon as he learnt about Momal realized how wrong he was, and ran after his love in a bid to save her. Alas! It was too late. Grieved by his fate, Rano also jumped and died in the burning oil well fire to reunite with the love of his life, Momal.

Momal Ji Mari is now a ruin, and is ranked among the archaeological heritage of not only Sindh but also of Pakistan. The folklore is also among the five classic love stories of Pakistan.

From the perception of oil and gas, the fact that oil was being traded in the area almost half a millennium ago rouses excitement. The folklore played an important role in the initial exploration of oil and gas in the area by the ESSO. When gas was finally discovered, the field was named after the *Mari*; an ancient name for 'place where there is oil'.

Apart from the Momal, there were eight more Maris (oil bearing areas) as mentioned in ancient folklores; thus oil was the trade and power in Vedas era. It is testimony that the very first oil fields in the subcontinent were discovered among these Marɨis including, Marɨi Indus at Attock. The very first natural gas reserves in subcontinent were also discovered not far from Marɨi tribe in Baluchistan. The present-day Mari Gas Field falls in Jaisalmer High, '*the Jaisalmer basin extends*

30,000 square kilometres in South west Rajasthan, it extends to Mari region of Pakistan and forms part of Indus Basin'.[17] Therefore apart from historical folklore, the geographical data validates the presence of hydrocarbon in the area encompassing the story.

17 Alok Shukla *Jaisalmer Basin, an integrated study.* Department of Applied Sociology, Indian School of Mines, Dhanbad.